Paper No. 28

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KAZUNORI MIYATA

Appeal No. 1999-2640
Application 08/918,267[1]

ON BRIEF

Before THOMAS, KRASS, and BARRETT, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

[1] Application for patent filed January 9, 1996, entitled "Method and Apparatus for Generating Textures for Display," which is a continuation of Application 08/097,800, filed July 27, 1993, now abandoned, which claims the foreign filing priority benefit under 35 U.S.C. § 119 of Japanese Application 4-199623, filed July 27, 1992.

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 1, 2, 4-6, 8, 9, and 11-13. Claims 3, 7, 10, and 14 have been canceled.

We reverse.

BACKGROUND

The invention relates to a method and apparatus for generating a texture for line segments. As shown in Fig. 1, a plurality of three-dimensional line segments are input at 1 (defined by a mathematical function or by use of a graphics input device, specification, p. 7, lines 3-6), line coordinates within the coordinate range are generated at 5 (i.e., the line segment is converted into a two-dimensional coordinate value of the initial or terminal point of each line segment, specification, p. 5, lines 17-24), the line coordinates are used to generate a position value for each position within the coordinate range at 2 and 6 (i.e., the straight line is rasterized into a sequence of point data), and a texture value is generated for each position within the coordinate range at 7 and 3 (i.e., an evaluation value is applied for each point of the point sequence, Figs. 2-5).

Claim 1 is reproduced below.

1. A method of generating a texture for a plurality of positions within a coordinate range, consisting of the steps of:

generating, in response to a plurality of line segments, a plurality of line coordinates within the coordinate range, the plurality of line segments including line segments in differing planes to provide a three-dimensional appearance;

generating, in response to said line coordinates, a position value for each position within the coordinate range; and

generating, in response to each position value, a texture value for each position within the coordinate range.

The Examiner relies on the following references:

Kato et al. (Kato) 5,369,736 November 29, 1994
(filed November 22, 1993)
Thier et al. (Thier) 5,410,644 April 25, 1995
(effective filing date March 29, 1990)

Foley et al. (Foley), Computer Graphics: Principles and Practice (2d ed. Addison-Wesley Pub. Co. 1990), pp. 617-647, 666-669, and 740-743.

Claims 1, 2, 4-6, 8, 9, and 11-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kato, Foley, and Thier.

We refer to the final rejection (Paper No. 15) (pages referred to as "FR__") and the examiner's answer (Paper

No. 21) (pages referred to as "EA__") for a statement of the rejection, and to the revised brief (Paper No. 27) (pages referred to as "Br__") for a statement of Appellant's arguments thereagainst.

OPINION

The claims are grouped to stand or fall together (Br3). Claim 1 is analyzed as representative.

As an initial matter of claim interpretation, we note the use of the transition phrase "consisting of" in claims 1 and 8. This phrase excludes other steps in claim 1 and other structure or means in apparatus claim 8.

The Examiner finds that Kato discloses the claimed subject matter except for generating a texture value for each position by surface rendering color information based on position values generated for each position (FR3). The Examiner seems to find that Kato teaches generating textures as recited in claim 1, but does not do so "by surface rendering surface color information based on position values generated for each position" as recited in claim 8. The Examiner finds that Foley shows generating texture for each position in Fig. 14.32, page 643, which is said to shown

filtering applied to texture generation (FR3). The Examiner finds that Thier shows line segments in different planes for texture mapping in the abstract (FR3). The Examiner concludes that it would have been obvious "to apply line segment based texturing . . . to Kato because of the line segments forming texture variables shown in Fig. 6B" (FR3). The Examiner also concludes that it would have been obvious "to apply Foley's texture filtering generating texture for each position by surface rendering surface color information based on position values generated for each position and Thier's multiple planes to Kato because of Foley's taught application of filtering techniques to texture generation such as Kato's and Thier's" (FR4).

Kato is directed to a texture mapping technique. Texture mapping maps a two-dimensional image, known as a texture map or texture picture, onto the surface of a three-dimensional object by transforming (distorting) the image into the object coordinate system and onto the surface of the object (Foley, pp. 741-743; Kato, Figs. 6A-6C). Texture mapping assumes that a strict three-dimensional shape (configuration) on a surface of an object to be applied with a texture is previously known

(Kato, col. 1, lines 24-30). Where a surface shape (configuration) of an object to be mapped is not known, the shape has been assumed and texture processing has been carried out on a trial and error basis (Kato, col. 1, lines 36-43). Kato discloses three ways of estimating a three-dimensional shape of an object to be mapped which minimize trial and error factors.

It is clear that Kato is not directed to the same method of generating textures as the claimed invention. The claimed invention does not employ texture mapping, but uses an evaluation function, such as those in Appellant's Figs. 3-5. Nor does the claimed invention involve estimating a three-dimensional shape on a surface of an object as in Kato, because the shape is defined by the input line segments. To the extent the Examiner considers that the claims are so broad that they read on Kato, despite the differences in actual invention, it is the Examiner's duty to explain how the claims are interpreted broadly to read on Kato.

Appellant argues that Kato does not disclose any of the three steps of claim 1 (Br4-5). We agree. The Examiner finds that generating line points located on line segments is shown

in Fig. 6B (FR3). However, Fig. 6B merely shows a two-dimensional image (texture image or texture map) to be mapped onto the surface of an object. The rectangular grid pattern is used, instead of pictures like Figs. 16.25(a)-(f) of Foley, so that the mapping transformation is clear; note how the right angles and equal sides of the grid squares become distorted when mapped to an object as in Fig. 6C. Even if the lines in Fig. 6B were line segments, they are not "in differing planes to provide a three-dimensional appearance," as claimed because Fig. 6B is a two-dimensional coordinate system as evidenced by Fig. 7A. Moreover, we do not understand the Examiner's assertion that Fig. 6B shows generating line points located on line segments. Claim 1 calls for generating "line coordinates," i.e., coordinates of the line. As disclosed, these coordinates may correspond to the initial or terminal point of each line segment (specification, p. 5, lines 17-24). A "coordinate" is a defined as "any of a set of numbers used in specifying the location of a point on a line, on a surface, or in space," Webster's New Collegiate Dictionary (G. & C. Merriam Co. 1977). The Examiner has not explained, and it is not apparent

to us, how Fig. 6B (or anywhere else in Kato) shows generating sets of numbers specifying the coordinates of the line segments.

The Examiner finds that generating positions is shown by the mapping operation of Fig. 1, step 204. We do not understand this finding. Part of the problem is that we do not find the previous step of generating a plurality of line coordinates specifying the line segments and, thus, do not see how Kato generates a position value for each position "in response to said line coordinates," as claimed. The term "position value" in claim 1 refers to a value for each position of the line segment, presumably every pixel location of the line segment, not every for every position in the coordinate range. The mapping step 204 in Fig. 1 maps (transforms) a point on the texture picture of Fig. 6B to a point on the surface of the object as shown in Fig. 6C. It is not known how this relates to, or could be considered to disclose, generating a position value in response to line coordinates.

The Examiner appears to find that Kato discloses generating texture in Fig. 6C. Figure 6C shows the result of

texture mapping and broadly shows generating a texture value for each position on the seat back. Claim 1 does not preclude generating a texture value for each position on the seat back by texture mapping and claim 1 does not require use of an evaluation function. However, since Kato lacks the earlier steps of claim 1, it cannot satisfy this last step.

As previously noted, the Examiner seems to find that Kato teaches generating textures as recited in claim 1, but does not do so "by surface rendering surface color information based on position values generated for each position" as recited in the narrower claim 4, which is not at issue. Nevertheless, we consider the teachings of Foley and Thier.

Appellant argues that Foley describes the use of prefiltering before sampling, or postfiltering after sampling, to perform anti-aliasing of a displayed image and all that would result from Foley would be perhaps a better rendering of the lines in the mapped picture of Fig. 6C (Br5-6). It is argued that the Examiner is in error in asserting that Foley teaches application of filtering to "texture generation" and there is no illustration or discussion of texture generation

in Fig. 14.32 of Foley or the associated text relating to this figure (Br7).

Figure 14.32 of Foley is directed to filtering over an array of supersampled (supersampling is taking more than one sample for each pixel and combining them, Foley, p. 620) values for the purpose of antialiasing (i.e., reducing the jagged or stairstep appearance of lines due to the finite size of the pixel). Filtering combines the samples to create a new sample; note that the 11x11 block is reduced to a 5x5 block. Filtering has no apparent direct connection to generating a texture value. In any case, Foley lacks the specific steps of claim 1.

Appellant argues that the Examiner errs in finding that Thier shows line segments in different planes for texture mapping in the abstract, that the Examiner provides no basis for combining the references, and that Thier does not cure the deficiencies of Kato (Br6).

The Examiner responds that Thier shows line segments in different planes for texture mapping in its abstract "by virtue of folding lines in different directions, hence planes creating patches, i.e. texture" (EA6).

We find nothing in Thier that would cure the significant deficiencies of Kato and Foley.

In summary, we conclude that the Examiner has failed to establish a prima facie case of obviousness. The rejection of claims 1, 2, 4-6, 8, 9, and 11-13 is reversed.

REVERSED

JAMES D. THOMAS Administrative Patent Judge	)
ERROL A. KRASS Administrative Patent Judge	) BOARD OF PATENT APPEALS AND INTERFERENCES
LEE E. BARRETT Administrative Patent Judge	)

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